AMENDMENTS TO THE SPECIFICATION

Please add the following paragraph to page 1 after the Title of the Invention:

This is a Divisional Application of U.S. Application Serial No. 09/666,102, filed September 20, 2000.

Please amend the paragraph beginning on line 24 of page 1 as follows:

The AV data recorded on the DVD-RAM conforms to an international standard called MPEG (ISO/IEC13818). The capacity of the DVD-RAM, though several giga bytes, is not enough to record ~~not-compressed~~ uncompressed digital AV data. The AV data is therefore recorded after it is compressed. The MPEG standard is prevalent as a method for compressing AV data. Thanks to the recent progress in the LSI circuit technology, MPEG codec (compression/decompression LSI) has come into practical use. This has made it possible for DVD recorders to compress/decompress digital data in accordance with the MPEG standard.

Please amend the paragraph beginning on line 4 of page 7 as follows:

The following is an explanation using a complicated image A as an example. As shown in FIG. 3B, since the image A requires a great amount of encoding, the data starts to be transferred to the video buffer at time t1 before the decoding time. The period between the data input start time t1 and the decoding time is referred to as "vbv_delay". According to the standard for DVD-RAM, to ensure the normal operation of the decoder during reproduction, the amount of Pictures generated by the video encoder and timing with which the system encoder multiplexes should be controlled so that the change of the amount of data in the video buffer shown in FIGs. 3A to 3D ranges 0 to ~~224KB~~ 224 KB. The audio data needs not be transferred as earlier as the video data since it does not require such a dynamic control of the amount of encoding. As a result, it is typical that the audio data is multiplexed a little earlier than the decoding time. Accordingly, among the video data and the audio data to be presented at the same time, the video data starts to be multiplexed earlier than the audio data. In MPEG, a time period during which data is stored in the buffer is defined.

According to the definition, all data except for still picture data should be output from the buffer to the decoder in one second after the data is input to the buffer (this definition is called "one-second rule"). As a result, the difference between the video data and the audio data at multiplexing is one second at most (strictly speaking, the difference may be larger than this when the difference with the reorder buffer for the video data is added).

Please amend the paragraph beginning on line 14 of page 12 as follows:

The variable bit rate technique for MPEG video assigns a smaller number of Pictures to a frame whose image is less complicated and moves less. In doing this, the amount of data included in the Pictures is less than the payload 23 in the pack, a plurality of frames are stored in the payload 23. Meanwhile, as shown in FIG. 9B, each frame is decoded every ~~33.3667msec~~ 33.3667 msec during presentation. Here, suppose that five frames of Picture data is stored in the payload 1203 in the pack 1201 as shown in FIG. 9A. Then, the Picture data in "frm5" having reached the decoder waits for at least ~~100.1001msec~~ 100.1001 msec (during which "frm2" to "frm4" are decoded) in the video buffer 33 before it starts to be decoded. Here, if there was no limit to the number of frames included in one pack, and 32 or more frames of Pictures were stored in a pack, the Picture in the 32nd frame would wait in the decoder buffer for more than one second before it is decoded for the same reason as the example shown in FIGs. 9A and 9B. This violates the MPEG rule, and may cause the decoder to malfunction during presentation.

Please amend the paragraph beginning on line 15 of page 18 as follows:

With the above construction, even if a pack stores in advance picture data having been expected to be stored a certain time later, a time the picture data should be input to the decoding apparatus is delayed. This easily prevents ~~a lot of~~ a number of pictures being stored in the video buffer of the decoder ~~enough~~ to break the one-second rule. ~~rule from being stored in the video buffer of the decoder.~~

Please amend the paragraph beginning on line 17 of page 24 as follows:

~~FIG. 5 shows~~ FIGs. 5A and 5B show the logical construction of DVD-RAM;

Please amend the paragraph beginning on line 17 of page 26 as follows:

The input unit 1003 inputs external video ~~signals~~ and audio signals ~~from outside~~.

Please amend the paragraph beginning on line 18 of page 28 as follows:

The stream data transfer ~~means~~ unit 211 extracts parts of the streams one by one from the ~~viedeo~~ video buffer 204, audio buffer A 205, and audio buffer B 206, and stores the extracted parts into the storage unit 212.

Please amend the paragraph beginning on line 23 of page 29 as follows:

The system encoder 207 generates system streams which allow a decoder to conform to the "one-second rule". FIG. 13 shows a model of the change in the amount of data stored in the video buffer 33 of the decoder. As shown in FIG. 13, Pictures in packs are ~~sequencially~~ sequentially input to the video buffer 33 at the times specified by the SCRs. This increases the storage amount Vbv. A Picture is output for decoding from the video buffer 33 at each DTS time (every ~~33.3667msec~~ 33.3667 msec). This decreases the storage amount Vbv. With the ~~ealier~~ earlier-defined meaning of the values j and k, the value (j-k) represents the number of Pictures stored in the video buffer 33 during one second before the time indicated by the current SCR. Since it takes ~~33.3667msec~~ 33.3667 msec to decode one Picture, the video buffer 33 stores Pictures corresponding to (j-k)X ~~33.3667msec~~ 33.3667 msec. The system encoder 207 limits the value (j-k) to the value n (an integer of 29 or lower and having been predetermined in the system) by adjusting SCR written in the pack, thus generating such system streams as conform to the one-second rule.

Please amend the paragraph beginning on line 2 of page 31 as follows:

The system encoder 207 then calculates value k, being the total number of Pictures output from the video buffer 33 up to one second before the time indicated by the current SCR. Here, when

the initial value for DTS is represented as DTSO, k is an integer included in a result of (SCR - DTSO - ~~1sec~~ 1 sec)/~~33.3367msec~~ 33.3367 msec. The value k is 0 until SCR exceeds (DTS + ~~1sec~~ 1 sec) (step S1203).

Please amend the paragraph beginning on line 8 of page 31 as follows:

The system encoder 207 proceeds to the following process when there is no incompletely written video pack left. When value (j-k) is n or higher, or when the video buffer 33 ~~is to cause an~~ would overflow if it receives a new Picture in a video pack (i.e., when the amount of data (Vbv) stored in the video buffer is to exceed ~~224KB~~ 224 KB if the amount of data of the new video Picture is added), the system encoder 207 stops generating video packs, jumps to step S1211, and updates SCR (steps S1205, S1206, and S1211).

Please amend the paragraph beginning on line 16 of page 31 as follows:

When value (j-k) is lower than n and when the video buffer 33 is not expected ~~to cause an~~ overflow, the system encoder 207 generates a video pack and increments Vbv by the amount of data of the Pictures stored in the video pack (Packed Pictsize) (steps S1205, S1206, S1207, and S1208).

Please amend the paragraph beginning on line 15 of page 32 as follows:

When the updated SCR is equal to or higher than DTS, a Picture is decoded. The system encoder 207 therefore decrements Vbv by the amount of data of the Picture, and adds ~~33.3667msec~~ 33.3667 msec to the DTS (step S1214 and S1215).

Please amend the paragraph beginning on line 1 of page 33 as follows:

Suppose that (j-k) for the pack 1301 shown in FIG. 13 is (n-1). Also suppose that the next pack stores the end portion of the $(Ln+1)^{th}$ Picture, a whole ~~$(^{th}Ln+2)$~~ $(Ln+2)^{th}$ Picture, and the first portion of the $(Ln+3)^{th}$ Picture. Here, the current SCR is written in the pack 1301, (j-k) = (n+l) since j is incremented by 2. The SCR of the pack is moved backward by one DTS in accordance with the flowchart shown in FIG. 14, and k is incremented by one. When this happens, (j-k)=n is maintained.

In this way, (j-k) can be limited to the predetermined value n or lower. When n is defined as an integer of 29 or lower, it is possible to conform to the one-second rule.

Please amend the paragraph beginning on line 5 of page 34 as follows:

When the total number of Pictures (including the case where only a part of one Picture is stored) stored in a pack is a predetermined number (in this embodiment, 2), the video encoder 201 generates as many "next start codes" as correspond to the remaining space of the pack. FIG. 15 shows an example in which "next start codes" are generated because two Pictures (frames) are stored in a pack. When the predetermined number is set to a lower number, it is expected that the amount of transferred dummy data will increase, the amount of transferred Pictures, which is important, will decrease, and the image quality will be degraded. In the present embodiment the predetermined number is set to 2. The value, that should enable the system streams to conform to the one-second rule and maintain the image quality, has been determined through experiments. The experiments have revealed that the system streams conform to the one-second rule and the image quality is not degraded drastically under conditions that the system stream transfer rate is ~~10.08Mbps~~ 10.08 Mbps and that the video data effective transfer rate is ~~9.6Mbps~~ 9.6 Mbps (approximately 630 packs are transferred per one second).

Please amend the paragraph beginning on line 2 of page 35 as follows:

FIG. 16 shows a model of the change in the amount of data stored in the video buffer 204 of the encoder. As shown in FIG. 16, Pictures are output from the video buffer 204 and inserted into packs at the times specified by the SCRs. This decreases the storage amount Vbb. A Picture generated by the video encoder 201 is input to the video buffer 204 at each FGrid time (every ~~33.3667msec~~ 33.3667 msec). This increases the storage amount Vbb.

Please amend the paragraph beginning on line 8 of page 36 as follows:

The stream data transfer ~~means~~ unit 211 extracts parts of the streams one by one from the video buffer 204, audio buffer A 205, and audio buffer B 206, and stores the extracted parts into the storage unit 212.

Please amend the paragraph beginning on line 12 of page 36 as follows:

The header data generating unit 213 writes SCR into the pack header, where the SCR is the time when the stream data transfer ~~means~~ unit 211 extracted the Picture from the video buffer 204.

Please amend the paragraph beginning on line 16 of page 36 as follows:

The condition judging unit 215 judges whether the amount of data (Vbb) stored in the video buffer 204 is expected to be a positive value if the stream data transfer ~~means~~ unit 211 stores a Picture.

Please amend the paragraph beginning on line 22 of page 36 as follows:

The stop/resume control unit 216, when the condition judging unit 215 judges the above negatively, causes the header data generating unit 213 not to write SCR into the pack header and causes the stream data transfer ~~means~~ unit 211 to temporarily stop storing Pictures.

Please amend the paragraph beginning on line ^ of page ^ as follows:

The stop/resume control unit 216 causes the time updating unit 217 to update SCR after the above temporary stops, and causes the condition judging unit 215 to judge, for each update, whether Vbb is expected to be a positive value. The stop/resume control unit 216 causes the header data generating unit 213 to resume writing SCR into the pack header and causes the stream data transfer ~~means~~ unit 211 to resume storing Pictures when the condition judging unit 215 judges the above positively.

Please amend the paragraph beginning on line 4 of page 38 as follows:

When the updated SCR is equal to or higher than FGrid, the system encoder 207 judges that the next Picture is stored in the video buffer 204, increments Vbb by the amount of data of the next Picture, and adds ~~33.3667msec~~ 33.3667 msec to FGrid (steps S1408 and S1409).

Please amend the paragraph beginning on line 4 of page 44 as follows:

(6) In Embodiment 1, to generate system streams conforming to the "one-second rule", predetermined value n of the system is set to 29 or lower when the video frame cycle is ~~33.3667msec~~ 33.3667 msec. However, the predetermined value n of the system may be set to 1/T when ~~when~~ the video frame cycle is T seconds.

Please amend the paragraph beginning on line 9 of page 44 as follows:

(7) In Embodiment 2, FGrid is a multiple of ~~33.3667msec~~ 33.3667 msec (video frame cycle). However, the FGrid time may be set to a multiple of a slice cycle (1/30 of the video frame cycle), where a frame includes 30 slices.